FULTON COUNTY PURCHASING DEPARTMENT

Winner 2000- 2005 Achievement of Excellence in Procurement Award
National Purchasing Institute

Jerome Noble, Director

April 5, 2006

RE: **# 06RFB48856K-RS, BUTTERFIELD LANE SEWER REPLACEMENT (S225)**

Dear Bidders:

Attached is one (1) copy of Addendum 3, hereby made a part of the above referenced Invitation to Bid (ITB).

Except as provided herein, all terms and conditions in the bid referenced above remain unchanged and in full force and effect.

Sincerely,

Rholanda M. Stanberry

Chief Assistant Purchasing Agent

130 Peachtree Street, S.W. · Suite 1168 · First Floor · Atlanta, Georgia 30303-3459 · Telephone (404) 730-5800

This Addendum provides additional information, requirements, terms and clarifications regarding this project.

The BID DUE TIME AND DATE has been changed to: 11:00 A.M. Monday, April 17, 2006

Question: What manholes are to be lined, raised and reconnected?

Response: All manholes will be lined and reconnected. No manhole raising is anticipated.

Question: Section 2.06 A of Addendum TWO 2nd Part, ELASTOMERIC CORBEL SEAL TO EXCLUDE RDI/I list Flex-Seal Utility Sealant as manufactured by Sealing Systems, Inc. or approved equal. What is the process and procedure to being approved for this section?

Response: Provide to the designated Construction Manager a submittal for suggested equal signed and stamped by Georgia PE. Construction Manager will determine a acceptability of submitted equal product.

Question: What is the procedure to get a product approved as an equal on the Butterfield Project?

Answer Provide to the designated Construction Manager a submittal for suggested signed and stamped by Georgia PE. Construction Manager will determine acceptability of submitted equal product.

Question: In line item 3 Manholes: the quantity is 17; the depth is up to 10 feet and calls for The Poly-Triplex liner to be used. Are these manholes located in the road or off the road where access to the structures might require crossing private property?

Answer: Both.

Question: If the manholes are located off road, Line Item 9 and 11 address construction entrances and clearing the easement are there manholes to be lined on this easement?

Answer: Yes, there are manholes to be lined within existing sewer easements. All manholes will be lined.

Question: Can you provide the Manhole numbers to be lined with the Poly-Triplex liner for visual inspection to evaluate access to these structures?

Answer: There are 17 manholes to be lined. The manhole numbers are shown on the project map.

D. The following changes are hereby made:

Insert the following attached Sections:

1. **SECTION NO. 00900; TECHNICAL SPECIFICATIONS**

2. **SEWPERCOAT PRODUCT SPECIFICATIONS**
   SEWPERCOAT INSTALLATION INSTRUCTIONS

ACKNOWLEDGEMENT OF ADDENDUM NO. 3

The undersigned bidder acknowledges receipt of this addendum by returning one (1) copy of this form with the proposal package to the Purchasing Department, Fulton County Public Safety Building, 130 Peachtree Street, Suite 1168, Atlanta, Georgia 30335 by the ITB due date and time **Monday, April 17, 2006, no later than 11:00 A.M.**

This is to acknowledge receipt of Addendum No. 3, _____ day of _____, 2006.

_____
Legal Name of Bidder

_____
Signature of Authorized Representative

_____
Title

S225 – BUTTERFIELD LANE SEWER REPLACEMENT
SECTION NO. 00900
TECHNICAL SPECIFICATIONS

PART 1 SERVICE LINES

1.01 Remote Reconnection and Grouting of Service Lines

A. Reconnection of Service Lines by Remote Methods

1. After the liner has been cured; the Contractor shall reconnect only the existing active service connections. The reconnection of service connections and laterals shall be done without excavation, from the interior of the newly installed liner by the use of a remote controlled cutting device equipped with a television monitor. All active connections shall be satisfactorily opened to the approximate size and shape of the original opening and shall be smooth and flush wherever there is a chance of debris buildup. In some cases, remote reconnection may not be possible. In these instances, reconnection by conventional methods in accordance with the standard specifications is applicable.

2. If in the course of the work, an existing service connection is omitted and the contractor must return to that location to reconnect a service.

B. Packer-Grouting of Service Connections

1. Preparatory Procedures

a. Cleaning shall be performed by the Contractor using a hydraulic cleaner and is to be adequate for seating a lateral packer. The Contractor will inspect the line by a "Quick Pull" to determine if the sewer line is clean, and if the laterals are accessible. Cleaning will continue until the "Quick Pull" inspection verifies that the service and lateral are clean and accessible.

b. Television inspection is limited to a "Quick Pull". During this inspection the operator notes obstruction, offset joints, debris, the location of lateral connections, and the general condition of each lateral. The "Quick Pull" inspection is videotaped, and only data relating to the lateral sealing report is logged. Also during this inspection, the Contractor determines which laterals can be accessed, and if there is enough clearance for the lateral sealing pacer. The Contractor makes the final determination on lateral sealing packer clearance.

2. Equipment

a. The lateral sealing inversion tube is designed to accommodate two sizes of laterals, 4-inch and 6-inch diameters, with a tube for each size. Both diameters' inversion tubes shall measure at least two feet in length.

3. Execution

a. Air testing laterals is accomplished by isolating the area to be tested with the packer and applying positive pressure into the isolated VOID area. A sensing unit is used for continuous monitoring of the Void pressure. This sensing unit is located within the Void area and accurately transmits pressure readout to the control panel.

b. The test procedure consists of applying air pressure into each isolated Void area. To isolate a Void, the lateral sealing packer is positioned straddling the lateral. The operator inflates the packer ends to isolate the lateral and inserts an inflatable inversion tube. Once the designated pressure in the isolated Void is displayed on the meter of the control panel, the application of air pressure is stopped and a twenty-second waiting period commences. The Void pressure is observed during this period. If the Void pressure drop is greater than that allowed in the following Air Test Table, the lateral is considered to have failed the air test and is grouted.

AIR TEST TABLE

Initial Void Pressure (psi)	VOID Pressure After 20 Seconds (psi)
12-11	4.8-4.4
11-10	4.4-4.0
10-9	4.0-3.6
9-8	3.6-3.2
8-7	3.2-2.8
7-6	2.8-2.4
6-5	2.4-2.0

c. After completing the air test for each individual lateral, the lateral packer is deflated, with the Void pressure meter continuing to display Void pressure. If the Void pressure does not drop to approximately zero, the equipment is adjusted to provide a zero Void pressure reading at the monitor.

d. Lateral sealing begins if the lateral does not pass the air test as described above. The lateral packer remains in position, maintaining the isolated Void. Chemical grout sealant is pressure injected through the lateral packer into the annular space between the inversion tube and the lateral pipe. Under pressure, the grout material is then forced out into the soil through leaking joints and pipe defects. The amount of chemical grout pumped is based on the number of pump strokes delivered to each lateral. The number is recorded on the sealing log.

e. Upon completion of the lateral sealing procedure the lateral is air tested a second time to verify the sealing of the connection. The air test is the same as outlined above. If the lateral fails the air test a second time, the grouting procedure is repeated. This sequence of air testing, grouting, and subsequent air testing is repeated until either the lateral is sealed or it is determined that the grout consumption is too high and may result in the blockage of the lateral pipe. The final determination to stop subsequent attempts to seal a service line will be made jointly between the Construction Manager and the Contractor.

f. Lateral flow is verified after the successful sealing of each lateral. With the lateral packer in position, the inversion tube is retracted and air pressure is injected into the

lateral. Should a pressure build in the lateral and not drop to approximately zero in a few seconds, the packer is moved off the connection and the connection is viewed with a television camera. With the camera viewing the connection point, an attempt is made to obtain a water flush by the occupant. If no water is viewed during the procedure, it is assumed the building sewer is blocked with grout and the responsibility to clear the lateral will be the Contractor's.

g. A notification form is attached to the door of each home or building for which laterals have been grouted. This notification to the occupant states that the lateral servicing this listed address was grouted on this particular date and if any blockage of sanitary flow occurs, the occupant should call a given phone number. The Contractor will supply a notification form to the Construction Manager for his approval.

h. The complete procedure is videotaped during the air testing and sealing operation. The videotapes are submitted to the Construction Manager for review and permanent record. The videotape displays the date, manhole numbers, footage to the service, and Void pressure readout. In addition, the data obtained during this operation is recorded on a service testing and sealing log provided by the Contractor.

4. Products

a. Chemical Sealing (Grouting) Materials – The Contractor shall submit a mix design for the review of the Construction Manager. The material selected is to be one recommended by the Remote Grouting Packer manufacturer that takes into account the temperature, soil condition, soil type and soil water content found in the Atlanta area.

b. The mixing and handling of the chemical grouting materials used shall be in accordance with the approved mix design and the manufacturer's recommendations.

5. Cleanup

a. The Contractor shall remove all residual grouting materials that extend into the pipe, reduce the pipe diameter, or otherwise restrict the flow in the pipe. The grouted connections shall be left reasonably "flush" with the existing pipe surface.

6. Warranty

a. The Contractor shall guarantee his work under Section 4.01 for warranty period of one (1) year from the date of acceptance. If, at anytime during the warranty period, any leakage, cracking, loss of bond, or other discontinuity is identified, the Contractor shall make repairs acceptable and at no additional cost to the Owner.

1.02 Manhole Height Adjustment

A. Products

1. Brick

a. Brick shall conform to ASTM C-32 for grade SM. Bricks shall conform to the following dimensions, unless otherwise approved by the Construction Manager:

	Depth (inches)	Width (inches)	Length (inches)

Standard Size	2-1/4	3-3/4	8
Allowable Variation	±¼	±¼	±½

b. **All Brick shall be new and whole, or uniform standard size and with substantially straight and parallel edges and square corners. Bricks shall be of compact textures, burned hard entirely through, tough and strong, free from injurious cracks and flaws, and shall have a clear ring when struck together. No soft or salmon brick shall be used except at such places, to such extent, and under such conditions as may be approved by the Construction Manager.**

2. **Mortar**

a. The Contractor shall use mortar meeting the requirements of ASTM C-270 Type S unless directed otherwise by the Construction Manager.

b. **The Contractor shall prepare mortar only in quantities needed for immediate use. Mortar which has been mixed for more than 30 minutes, which has set, or which has been retempered shall not be used.**

B. Execution

1. Procedures for Manhole Height Adjustment

a. The Contractor shall utilize maps, surveys, sounding instruments, or information from local residents to determine approximate location of buried manholes. Manholes shall be exposed utilizing hand techniques or by carefully probing with mechanical equipment. Manhole exposure in paved areas shall be accomplished by making a square cut in the surface with sufficient width to allow for the excavation of the material around the manhole to expose it to a depth necessary to facilitate adjustments.

b. The Contractor shall adjust the top elevation of the manhole frame to grade where indicated on the Plans or directed by the Construction Manager using brick and mortar conforming to the requirements of this section. A maximum adjustment of 16 inches will be allowed using brick and mortar. Mortar shall be applied to create a smooth finish on the interior and exterior prior to backfill. Adjustments greater than 16 inches must be made by removing the cone section and adding the appropriate precast riser section.

1.03 Manhole Interior Rehabilitation

A. Products

1. General

a. It is the intent that these specifications be non-preferential and not restrict rehabilitation methodology or materials to a single vendor or sole source.

b. All materials used for manhole rehabilitation shall be approved by the Construction Manager.

c. The installer shall warrant and save harmless the Owner and the Parsons PM Team against all claims for patent infringement and any loss thereof.

d. The Contractor shall handle and store all materials and shall dispose of all wastes in accordance with applicable regulations.

e. Each lining system shall be designed for application over wet (but not active running water) surfaces without degradation of the final product and the bond between the product and the manhole surfaces.

f. Fiberglass manhole inserts shall be used only as directed by the Construction Manager. Fiberglass manhole inserts shall not be used as in-kind substitution for a different, directed, method of manhole rehabilitation.

g. All Work shall be performed in strict observance of OSHA regulation, especially those related to confined space entry.

h. The contractor shall notify the Water Department and obtain approval and water meter, if required, before using fire hydrants.

2. Equipment

a. The required equipment shall consist of chemical pumps, chemical grout containers, injection packers, hoses, valves, and any other miscellaneous equipment required to seal the manhole. The chemical injection pumps shall be equipped with pressure meters to provide for monitoring pressure during the chemical sealant injection process. If necessary, fluid by-pass lines equipped with pressure regulated by-pass valves will be incorporated into the system.

3. Materials for Patching, Repainting, Filling, and Repairing non-leaking holes, cracks, and spills in concrete and masonry manholes.

a. The Contractor shall use a premixed non-shrink cement-based patching material consisting of hydraulic cement, graded silica aggregates, special plasticizing and accelerating agents, which has been formulated for vertical or overhead use. It shall not contain chlorides, gypsum, plasters, iron particles, aluminum powder, or gas-forming agents or promote the corrosion of steel it may come into contact with. Set time (ASTM C-191) shall be less than 30 minutes. One-hour compressive strength (ASTM C-109) shall be a minimum of 200 psi and the ultimate compressive strength (ASTM C-109) shall be a minimum of 5000 psi. Bond strengths (ASTM C-882 Modified) shall be a minimum of 1700 psi.

4. Spray Applied Urethane Resin System

a. Urethane resin liner shall be Spraywall as manufactured by Sprayroq or approved equal.

b. The urethane resin based liner material shall be used to form the sprayed on/structural enhanced monolithic liner covering all interior surfaces of the manhole including benches and inverts. The finished liner shall conform to the minimum requirements listed below.

PROPERTY	TEST METHOD	RESULTS
Compressive strength	ASTM D-695	10,500 psi
Tensile strength	ASTM D-638	5,000 psi

Shrinkage	ASTM D-2566	½ of 1%
Flexural strength	ASTM D-790	10,000 psi
Bond		shall exceed tensile strength of substrate
Flexural modulus	ASTM D-790	550,000 psi
Density		81 +/- pcf

c. The finished manholes shall be corrosion resistant to: Hydrogen Sulfide; 20% Sulfuric Acid; 17 % Nitric Acid; 5% Sodium Hydroxide as well as other common ingredients of the sanitary wastewater environment. Other material may be used as approved by the Construction Manager.

5. Cured-In-Place Epoxy Resin Liner System

a. Cured-in-Place Epoxy Resin Liner shall be Poly-TriPlex Liner System by SunCoast Environmental International, Inc. or approved equal.

b. The Cured-In-Place Epoxy resin based liner material shall be used to form a structural enhanced monolithic liner covering all interior surfaces of the manhole including benches and inverts. The finished liner shall conform to the minimum requirements listed below.

PROPERTY	**TEST METHOD**	**RESULTS**
Hardness	ASTM D-2240-75	82 Shore D
Tensile strength	ASTM D-63860	12,900 psi
Compressive strength	ASTM D-69554	18,600 psi
Flexural strength	ASTM D-79058T	17,400 psi
Ultimate Elongation	ASTM D-63860	6.0%
Bond		Shall exceed tensile strength of substrate
Flexural modulus	ASTM D-790	550,000 psi

c. The finished manholes shall be corrosion resistant to: Hydrogen Sulfide; 20% Sulfuric Acid; 17 % Nitric Acid; 5% Sodium Hydroxide as well as other common ingredients of the sanitary wastewater environment. Other material may be used as approved by the Construction Manager.

6. Fiberglass Manhole Insert

a. Fiberglass manhole inserts shall be as those manufactured by L.F. Manufacturing, Inc., or approved equal.

b. The fiberglass manhole insert shall be used as directed by the Construction Manager where manhole rehabilitation methods are inadequate. The final insert shall conform to the minimum requirements listed below.

PROPERTY	TRANSVERSE	LONGITUDINAL
Compressive strength	18,000 psi	10,000 psi
Tensile strength	18,000 psi	5,000 psi
Tensile strength	26,000 psi	4,500 psi
Flexural strength	1.4×10^6 psi	$.7 \times 10^6$ psi
Flexural modulus	$.6 \times 10^6$ psi	$.7 \times 10^6$ psi

B. Execution

1. Manhole Preparation

a. Cleaning: All concrete and masonry surface to be rehabilitated shall be cleaned prior to applying any lining system. All grease, oil, laitance, coatings, loose bricks, mortar, unsound brick or concrete and other foreign materials shall be completely removed. Cleaning shall include an acid wash using a 1:2 solution of muriatic acid followed by hydro blasting unless directed otherwise by the Construction Manager. Other methods such as wet or dry sandblasting, concrete cleaners, degreasers, or mechanical means may be required to properly clean surface. All surfaces on which these methods are used shall be thoroughly rinsed, scrubbed, and neutralized to remove cleaning agents and their reactant products. Debris resulting from cleaning shall be removed from the manhole and not allowed to be carried downstream.

b. Flow Control: The Contractor shall be responsible for plugging or diverting the flow of wastewater as needed for manhole rehabilitation or fiberglass insert Patching: Loose material shall be removed from the area to be patched exposing a sound sub-base. Holes or voids around steps, joints or pipes, spilled areas, and cavities caused by missing or broken brick shall be patched and missing mortar repaired using a non-shrink patching mortar conforming to the requirements of this section. Cracks not subject to movement and greater than 1/16 inch in width shall be routed out to a minimum width and depth of ½ inch and patched with non-shrink patching mortar conforming to the requirements of this section. Bench repair and patching of walls is considered incidental to manhole preparation for liner application.

c. All manholes which have exposed cured-in-place or deformed/reformed pipe segments in the manhole invert channel shall require the use of a concrete bonding adhesive prior to the spray application of the cementitious manhole liner. The bonding agent shall be any synthetic emulsion specifically formulated for bonding new concrete to existing surfaces. The bonding agent

shall be mixed and applied in accordance with manufacturer's recommendations.

d. All incoming or outgoing pipes shall be plugged or otherwise protected during liner application to prevent clogging. Manhole steps shall be protected during spraying or all laitance removed and steps thoroughly cleaned after spraying. If manhole steps must be removed during liner installation, the Contractor shall replace the steps.

2. Stopping Infiltration

a. The contractor shall use hydraulic cement to stop infiltration at each identified point of leakage into the manhole.

b. If the flow of water into the manhole is too great for stoppage utilizing hydraulic cement, the Contractor shall drill holes at each point of leakage that shall extend through the manhole wall. Chemical sealant injection devices shall be placed into the drilled holes in a manner to provide a watertight seal between the holes and the injection device.

c. Hoses shall be attached to the injection devices from an injection pump. A mixture of manhole chemical sealants shall then be pumped until material refusal is recorded on the pressure gauge of the pumping unit. The Contractor shall ensure that excessive pumping pressures do not develop that may cause damage to the manhole walls.

d. Once the injection of the chemical sealants have been completed, the injection packers shall be removed and the holes shall be filled and toweled flush with the surface of the manhole wall using a fast-set non-shrinking grout.

e. Excessively leaking manholes will be considered additional manhole preparation. The Contractor must notify and receive approval from the Construction Manager before additional preparation begins. Additional manhole preparation without approval from the Construction Manager will be considered incidental to the Work.

3. Spray Applied Urethane Resin System

a. Prior to entering manholes, an evaluation of the atmosphere will be conducted to determine the presence of toxic, flammable vapors or possible lack of oxygen. The evaluation shall be in accordance with local, state, or federal safety regulations.

b. No application of liner shall be made unless the temperature inside the manhole is 50^0F or higher.

c. After blocking flow through the manhole and thorough cleaning/preparatory work has been achieved, the spray-on urethane shall be applied to the invert, bench, and wall areas to produce a smooth coating and yield the required structural integrity and corrosion resistance. The spray shall be applied such that the entire manhole is a structurally enhanced monolithic liner. The invert and bench liner thickness shall be the same as that required at the bottom of the manhole walls as determined by the manufacturer's standard engineering calculations for groundwater pressure. The minimum thickness of the liner shall be as specified in the following table:

MINIMUM URETHANE RESIN LINER THICKNESSES	
Depth	Liner Thickness
≤ 10’	1/4 inch
>10’	3/8 inch

d. The finished invert surfaces shall be smooth, free of ridges, and will be sloped in the direction of flow. Special care shall be used to ensure a smooth transition between the new manhole invert and intersecting pipeline inverts such that flow will not be impaired.

e. The flow through the manhole shall be re-established as soon as practical and following the liner manufacturer’s recommendation for appropriate curing.

f. The urethane shall be manually sprayed onto all surfaces by a trained technician who is experienced in the application of a spray applied urethane resin and has been certified by the manufacturer. Appropriate personal protection equipment shall be utilized.

g. A minimum of 30 minutes curing time after the completion of spraying shall be allowed before subjection the manhole to active flow. In extremely cool weather, the manhole shall be protected while curing is in process to maintain the temperatures specified by the manufacturer.

4. Cured-In-Place Epoxy Resin Liner

a. Prior to entering manholes, an evaluation of the atmosphere will be conducted to determine the presence of toxic, flammable vapors or possible lack of oxygen. The evaluation shall be in accordance with local, state, and federal safety regulations.

b. The installation of the cured-in-place epoxy resin liner shall be in strict accordance with the manufacturer’s written instructions.

c. Once the liner is fully saturated with resin at the job site, it shall be lowered into the structure to the pre-marked position at the cover seat of the manhole entrance ring. The liner shall form a monolithic structure permanently connecting the ring and cover seat to the chimney, corbel, walls, benches, and invert. The liner shall be pressurized at a minimum of 500 lbs. per sq. ft., and heated by a temperature inversion system of pressurization with steam injection into the high velocity hot air column, creating a steam/convection oven atmosphere to create a liner temperature of approximately 200°F for at least two hours curing time.

d. Upon completion of the liner curing process, the inflation bladder shall be removed and all lines reopened and the liner cut off at the manhole cover seat.

e. The finished invert surfaces shall be smooth, free of ridges, and will be sloped in the direction of flow. Special care shall be used to ensure a smooth transition between the new manhole invert and intersecting pipeline inverts such that flow will not be impaired.

f. The flow through the manhole shall be re-established as soon as practical and following the liner manufacturer's recommendation for appropriate curing.

g. The liner shall be installed by a trained experienced technician who has been certified by the manufacturer. Appropriate personal protection equipment shall be utilized.

5. Spray Applied Epoxy Liner

   a. Application procedures shall conform to the recommendations of the monolithic surfacing system manufacturer, including material handling, mixing, environmental controls during application, safety, and equipment.

   b. The equipment shall be specially designed to accurately mix and apply the specified materials and shall be regularly maintained and in proper working order.

   c. The specified materials must be applied by an approved installer of the monolithic surfacing system.

   d. All specified surfaces will be lined with the monolithic surfacing system to provide the minimum total thicknesses shown in the following table. The cured surface shall be monolithic with proper sealing connections to all unsurfaced areas and shall be placed and cured in three applications in conformance with the recommendations of the monolithic surfacing system manufacturer. The layers shall be applied with a 1 to 2 hour set time not to exceed 48 hours.

MINIMUM EPOXY LINER THICKNESSES	
Depth	Liner Thickness
≤ 10'	1/4 inch
>10'	3/8 inch

   e. Specially designed spray and/or spin cast application equipment shall be used to apply each coat of the system.

   f. During application a wet film thickness gage meeting ASTM D4414 – Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used to ensure a monolithic coating and uniform thickness during application.

6. Fiberglass Manhole Insert

   a. Prior to entering manholes, an evaluation of the atmosphere will be conducted to determine the presence of toxic, flammable vapors or possible lack of oxygen. The evaluation shall be in accordance with local, state, and federal safety regulations.

b. The installation of fiberglass manhole inserts shall be in strict accordance with the manufacturer's written instructions.

c. Once the frame, cover, and cone section of the existing manhole has been removed, the fiberglass insert shall be lowered into the structure. At this time, the contour of the existing bench shall be marked on the fiberglass insert. The insert shall then be removed and cut along the contour mark. Set the liner into the existing manhole in a concentric manner. Fiberglass is then installed between the bottom of the inset and the existing manhole with concrete grout poured and compacted evenly in one-foot lifts. Finally, install frame and cover to grade and backfill.

7. Cleanup

a. After the installation work has been completed, the Contractor shall cleanup the entire project area. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor. The work area shall be left in a condition equal to or better than it was prior to the performance of the Work. Disturbed grassed areas shall be seeded and or landscaped as directed by the Construction Manager at no additional cost to the Owner. Site restoration shall be performed in accordance to all applicable Fulton County Standards.

8. Warranty

a. The Contractor shall guarantee his work in Section 4.04 for warranty period of five (5) years from the date of acceptance. If, at anytime during the warranty period, any leakage, cracking, loss of bond, or other discontinuity is identified, the Contractor shall make repairs acceptable and at no additional cost to the Owner.

PART 2 SUBMITTALS

2.01 Not Used

2.02 Manufacturer's Brochures

A. The Contractor is required to submit four (4) copies of the manufacturer's brochures giving a complete description of the product proposed, its physical and chemical composition, the same for the thermo-setting resin or epoxy hardener, the recommended range of curing temperature, period of cure, cool-down procedures and method of installation. Three (3) copies are to be sealed in an envelope addressed:

Parsons PM Team
141 Pryor Street, Suite 3077
Atlanta, GA 30303
Attention: Assigned Construction Manager

2.03 Pre-Installation Television Tapes and Logs

A. To be submitted during the course of the work; 2 copies of each, Required for project close-out.

2.04 Traffic Control Plan and Permits

A. Signed and sealed by a professional engineer licensed to practice in the State of Georgia. To be submitted during the course of the work for each phase of the work.

2.05 Proposal to Temporarily Interrupt Sewer Service

A. During the course of and for each segment of the work, for the review and approval of the Construction Manager, provide contractor's evaluation of property usage and impacts because of proposed interruption of service.

2.06 Notification of Intention to Interrupt Sewer Service.

A. During the course of and for each segment of the work, draft for the review and approval of the Construction Manager, copies of notifications mailed, receipts for certified mail, logs and records of personal and telephone contacts, related correspondence and inquiries by the public and replies.

2.07 Contractor's Proposal to Bypass Sewage and Sewer Flows.

A. During the course of and for each segment of the work, for the review and approval of the Construction Manager.

2.08 Post-Installation Television Tapes and Logs

A. Prior to acceptance of, during the course of and for each segment of the work, for the review and approval of the Construction Manager. 2 copies each. Required for close-out.

2.09 Certification of Supplier/Manufacturer of Liner System Employed

A. That the materials furnished entering the work met the requirements of the industry, the standards of good practice, and these specifications. Required as part of submittal.

2.10 Certification of the Contractor

A. Letter of Certification that the lining system used was installed in full accordance with the manufacturer's recommendations and these specifications.

2.11 Submittals for Ancillary Work Items

A. The awarded vendor will be required to submit four (4) copies of the manufacturer's brochures giving a complete description of the product proposed its physical and chemical composition and manufacturer's recommendations. Three (3) copies are to be sealed in an envelope addressed:

Parsons PM Team
11575-H Maxwell Road
Alpharetta, GA 30004
Attention: **Andrew Gordon, Construction Manager**

B. Submittals (10 copies) shall be specifically required for:

a. Remote Reconnection Device – Manufacturer's Brochure

b. Remote Packer-Grouting Device – Manufacturer's Brochure

c. Manhole Interior Rehabilitation – Fiberglass Liner System

d. Manhole Interior Rehabilitation – Contractor selected Spray Applied or Cured-in- Place System

C. Submittals for Ancillary Work shall include all information necessary to demonstrate that the recommended product meets or exceeds the requirements of these Specifications. 10 copies of each.

2.12 Other Submittals

A. As may be required elsewhere, that are necessary to accomplish the plan intent and as may be required by the Construction Manager**.**

2.13 Compensation for Submittals

A. Submittals are considered as incidental to the other items of work in the bid proposal and no additional compensation will be paid the contractor therefore.

2.14 Testing Results

A. The Contractor shall submit all test results to the Construction Manager within two weeks of performing any test described in this Section 00 900. If a test fails, the Contractor shall submit a corrective plan within two weeks of performing any test described in this Section 00900.

END OF SECTION # 00900

SPRAY APPLIED CALCIUM ALUMINATE CEMENTITIOUS LINER

1. Material supplied under this specification shall be a prepackaged mortar mix, including all cement, aggregates, and any required additives. It is the intent of this specification that the Contractor only be required to add the proper amount of potable water so as to produce concrete suitable for pneumatic application. Typical package weights shall not be less than 50 lbs and shall be identical for all material furnished on this project
2. The chemical composition of the cement portion as well as the aggregates of the mortar mix shall be as follows:

Al_2O_3	CaO	$FeO + Fe_2O_3$	SiO_2
39-44%	35-39%	9-14%	5-7%

3. The design properties of the mortar mix shall be as follows:

Compressive Strength (ASTM C495)	> 7,000 psi	24 hours
	> 9,000 psi	28 days
Flexural Strength (ASTM C293)	> 1,200 psi	24 hours
	> 1,400 psi	28 days
Splitting Tensile Strength (ASTM C496)	> 800 psi	24 hours
Bond Strength/Slant Shear (ASTM C882)	> 1600 psi	28 days
Shrinkage at 28 days (ASTM C596)	< 0.06% cured @ 90% relative humidity	
Freeze/Thaw after 300 Cycles (ASTM C666)	No visible damage after 300 cycles	

4. The mortar mix shall be SewperCoat as manufactured by Lafarge Calcium Aluminates or approved equivalent.
5. Mortar mix must have at least five (5) years of successful performance in similar applications and be supplied by an ISO 9002 approved manufacturer.
6. In addition, the mortar mix shall be designed to withstand long-term exposure to a bacterially corrosive hydrogen sulfide environment that may be expected to produce a pH of 1 on normal Portland Cement concrete or typical brick and mortar surfaces.
7. Water used in mixing shall be fresh, clean, potable water, free from injurious amounts of oil, acid, alkali, vegetable, sewage and/or organic matter. Water shall be considered as weighing 8.33 pounds per gallon.
8. Mortar mix shall be stored with adequate provisions for the prevention of absorption of moisture. It shall be stored in a manner that will permit easy access for inspection and identification of each shipment.

TECHNICAL SPECIFICATION

INSTALLATION OF SPRAY APPLIED CALCIUM ALUMINATE CEMENTITIOUS LINER

EXECUTION

Sampling and Testing

1. A recognized independent testing laboratory shall test mortar materials used on the project. The Manufacturer, instead of an independent laboratory, may test project sample specimens, provided the Owner, Engineer, and Manufacturer are in agreement of this testing method prior to project commencement. Specific materials recommended by the Engineer shall then be tested.
2. Any materials failing to meet the requirements of these specifications shall not be incorporated into the work plan.

Qualification of Work Crew

3. Prior to project commencement, the Contractor must satisfy the Engineer that all Contractor's work crew personnel have performed satisfactory work in similar capacities elsewhere for a sufficient period of time to be fully qualified to properly perform the work in accordance with the requirements of the related specifications (minimum 5 years).
4. Foreman shall have at least 5 years experience with similar work and project conditions.
5. Nozzlemen shall be qualified by having had similar work experience.
6. Project responsibilities prior to application of SewperCoat shall include the following:
    a) Ensure all sub-surfaces are clean and free of laitance or loose material.
    b) Ensure that overhead sub-surfaces have been prepared to a minimum degree of roughness designated as **CSP 4** by the **International Concrete Repair Institute** (ICRI) *Guideline No. 03732 – Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays*. This reference document explains the means and methods of achieving the minimum designated degree of roughness. The contractor should consider utilizing a higher standard depending upon the surface conditions.
    c) Ensure that sub-surfaces other than overhead have been prepared to a minimum degree of roughness designated as **CSP 3** by the **International Concrete Repair Institute** (ICRI) *Guideline No. 03732 – Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays*. This reference document explains the means and methods of achieving the minimum designated degree of roughness. The contractor should consider utilizing a higher standard depending upon the surface conditions.

d) Ensure the operating air pressure is uniform and provides adequate nozzle velocity for proper compaction.

e) Continuously regulate the water content so that the applied materials consistently achieve proper compaction with a low percentage of rebound and no visible “sag”.

f) Ensure that the installation equipment nozzle is held at the proper distance away from and as nearly perpendicular to the prepared sub-surface as the working conditions will permit to secure maximum material compaction with minimum rebound and no visible “sag”.

g) Follow a sequence routine that will fill corners with adequately compacted material applied at a maximum practicable layer thickness.

h) Determine necessary operating procedures for placement in confined spaces, extended distances or around unusual obstructions where placement velocities and mix consistency may need to be adjusted.

i) Direct the crew as to when to start and stop the flow of materials during installation and to immediately stop all work when material is not arriving uniformly at the nozzle.

j) Ensure that slough pockets are removed and prepared for installation of replacement material.

k) Bring the installed materials to established finished elevations in a neat and timely manner and within established tolerances.

7. Applicator’s job foreman shall operate the pneumatic mixing/placing equipment and direct the work of mixing crew personnel. Applicator’s work crew shall also maintain proper line pressures throughout the pneumatic mixing/placing equipment to ensure the necessary consistent nozzle velocity. Applicator’s work crew shall further see that all material fed to the nozzle is uniformly fed through this equipment.

EQUIPMENT

8. Equipment shall be of pneumatic type and approved by the material manufacturer. Alternate equipment may be utilized provided it meets the performance requirements of the specification. All equipment must also be kept in operating condition and good repair.

CONSTRUCTION METHODS

Surface Preparation

9. To ensure sufficient bond, all sub-surfaces shall be cleaned and prepared to a degree of roughness as described in this specification. Sub-surfaces shall also be thoroughly moistened with water prior to the application of the lining materials. In no instance shall shotcrete be applied in an area where running water exists. It is the intent of this specification that the existing surface be saturated just prior

to installation.

10. If applying to new concrete, the same criteria for sub-surface cleanliness, roughness, and saturation.

11. All surfaces to be lined shall be saturated with water just prior to lining materials application. If saturation does not occur naturally, it can be accomplished by presoaking all sub-surfaces for a minimum of 24 hours immediately prior to the application of the lining materials.

OPERATIONS

12. The Contractor shall provide all equipment necessary to individually gauge, control, and monitor the actual amounts of all component materials necessary to complete the lining installation. The type of equipment and methods used to gauge, control, and monitor component materials shall be subject to approval by the Engineer and Manufacturer.

13. All lining materials shall be thoroughly mixed by mechanical means to ensure all agglomerated particles are reduced to original size or removed prior to placement into the application equipment (i.e. the hopper). Each batch of material should be entirely discharged before recharging with fresh material. Mixing equipment shall be cleaned at regular intervals to remove all adherent materials.

14. The addition of water to the mix shall be in strict accordance with the Manufacturer's recommendations.

15. Re-mixing or tempering shall not be permitted. Rebound materials shall not be reused.

PROTECTION OF ADJACENT SURFACES

16. During progress of the work, adjacent areas or grounds which may be permanently discolored, stained or otherwise damaged by dust and rebound material, shall be adequately protected and, if contacted, shall be cleaned by early scraping, brushing or washing as the surroundings permit.

INFLOW and INFILTRATION PREVENTION

16. If inflow or infiltration is observed within the structure after surface preparation is complete, a rapid setting crystalline enhanced hydraulic cement product specifically formulated for infiltration control shall be used to stop minor infiltration flows in accordance with the manufacturer's recommendations. The material shall meet the following strength requirements:

Compressive Strength (ASTM C597B)	600 psi 1000 psi	(24 hours) (7 days)
Bond Strength (ASTM C321)	30 psi 80 psi	(1 hour) (1 day)

17. The material shall be Preco Plug, Octocrete, Burke Plug or Engineer approved

equal. Where infiltration flows are more severe, pressure grouting may be required. The material for pressure grouting shall be Avanti A-220, DeNeef or Engineer approved equal installed in accordance with the manufacturer's written instructions.

17. All materials, labor, equipment, and incidentals required to correct inflow and infiltration conditions will be considered incidental to rehabilitation.

APPLICATION OF MATERIALS

18. SewperCoat shall not be applied to a frozen surface or to a surface that may freeze within 24 hours of application. Frozen conditions shall be defined as ambient temperatures of 32 degrees Fahrenheit or below.

19. Sequence of application may be from bottom to top or vice versa if rebound is properly removed.

20. Application shall be from an angle as nearly perpendicular to the surface as practicable, with the nozzle held at least 1 foot from the working sub-surface (except in confined control). If the flow of material at the nozzle is not uniform and slugs, sand spots, or wet sloughs result, the nozzleman shall direct the nozzle away from the work until the faulty conditions are corrected. Such defects shall be replaced as the work progresses.

21. Application shall be suspended if:

    1) Air velocity separates the cement from the aggregate at the nozzle.

    2) Ambient temperature approaches freezing and the newly placed SewperCoat cannot be protected and insulated.

22. The time interval between successive layers of material application must be sufficient to allow “tackiness” to develop but not final set. If final set does occur, this surface shall be prepared in accordance with this document in order to provide a sufficient bond with succeeding applications.

23. Construction joints within a manhole shall be avoided. In the event a construction joint is necessary and approved by the Engineer, it shall be sloped off to a thin, clean, regular edge, at a 45-degree angle. Prior to placement of the adjoining materials, the sloped portion and adjacent applied material shall be thoroughly cleaned as necessary, then moistened and scoured with an air jet.

24. Nozzleman shall bring the material to an even plane and to well formed corners.

25. After the body coat has been placed, the surface shall be trued with a thin-edge screed to remove high areas and expose low areas. Low areas shall be properly filled with additional material to insure a true, flat surface in accordance with Section 4.5.5 of this document.

26. The minimum thickness of the SewperCoat shall be a ½ inch cover over all surfaces.

CURING

27. If the material has been applied and furnished in accordance to the specifications, and it has been determined that the environment is not moist enough for natural curing, the contractor will be required to apply a curing compound to all coated surfaces. Curing compound shall meet the requirements of ASTM C309 and have the approval of the lining material Manufacturer and the Engineer prior to use.

    Moist curing may also be used in lieu of curing compound. If moist curing is selected, it should be implemented just after the notice of uniform heat generation of the installed lining. Moist curing can consist of the use of soaker hoses, water sprinklers, or vapor/misting machines. Regardless of delivery method, moist curing should continue for a minimum of 18 hours.